

Appendix L DelDOT Transportation Noise Policy

L.1 INTRODUCTION

This document constitutes the Delaware Department of Transportation's (DelDOT) policy with regard to future noise levels associated with certain types of transportation improvements. It specifies criteria to determine when noise abatement is to be considered for a particular location. It is anticipated that planners and designers will utilize the guidelines set forth in this policy to address traffic noise associated with highways and other transportation-related infrastructure.

This policy is based on the currently accepted practices and procedures used by Federal and state transportation departments to assess highway-related noise levels.

L.2 DEFINITIONS

Barrier – A natural or man-made object that interrupts the path of sound from the sound source to the sound receiver.

Decibel(dB) – A measure used to express the relative level of a sound in comparison with a standard reference level.

DBA – The noise levels in decibels measured with a frequency weighting network, corresponding to the "A-scale" on a standard sound level meter.

Design year – The future year for which traffic projections are made in establishing design criteria for a specific project.

Existing noise levels – The surrounding noise of an area. Measured in dBA, it provides a reference base for determining noise impacts when transportation improvements or new highways are being considered. When calculated, it is based upon noise levels experienced during the peak-hour of traffic.

Forecast traffic – Vehicular volumes predicted by the current long-range transportation plan.

Leg – The equivalent, steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same period.

Leq (h) – The hourly value of Leq (based upon the peak-hour percentage of the annual average daily traffic).

Noise abatement criteria – The maximum noise level recommended for the various land use activity categories.

Noise – Sound that is unwanted or undesirable.

Privacy fence – A barrier, approximately 8 to 12 feet in height, that is normally made of wood boards spaced closely together.

Receptor – An individual or site location registering measurable sound levels.

Traffic noise impacts – Impacts which occur when the predicted traffic noise levels approach or exceed specific absolute noise levels or when the predicted traffic noise levels substantially exceed the existing noise levels.

Transportation-related noise – Noise generated by the motor, tires, etc. of vehicles using the transportation system.

Type I projects – A proposed Federal or Federal aid highway project for the construction of a highway on a new location or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes.

Type II projects – A proposed Federal or Federal aid project for noise abatement on an existing highway.

The Federal Highway Administration (FHWA) has issued regulations for noise evaluation in 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. This document was formerly included in the Federal-Aid Highway Program Manual 7-7-3. The main objective of 23 CFR 772 is "to provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways approved pursuant to Title 23, U.S.C."

L.3.2 NOISE ABATEMENT CRITERIA

The FHWA has developed specific criteria that serve as the maximum recommended highway traffic noise levels for various types of land use. The noise abatement criteria, depicted in Table 1, are interpreted by DelDOT as values which, when approached or exceeded, require the consideration of traffic noise abatement measures. The Department considers the noise abatement criteria to be approached if traffic noise levels are within one decibel of the values shown in Table L.1.

L.3 FEDERAL HIGHWAY ADMINISTRATION GUIDELINES

L.3.1 INTRODUCTION

Figure L.1 Noise Abatement Criteria

Activity Category	Design Noise Level Leg (h)	Description of Activity Category
A	57 dBA	Tracts of land in which serenity and quiet are of (Exterior) extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 dBA	Picnic areas, recreation areas, playgrounds, active (Exterior) sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 dBA	Developed lands, properties or activities not included (Exterior) in categories A and B above.
D	_____	Undeveloped lands (lands, properties or activities not included in categories A, B, or C above).
E	52 dBA	Residences, motels, hotels, public meeting rooms, (Interior) schools, churches, libraries, hospitals and auditoriums (with windows closed).

DelDOT considers noise mitigation when either of the following conditions is satisfied:

- Predicted (design-year) noise levels approach or exceed the NAC levels given in Table L-1. DelDOT considers a noise impact to occur when the design noise level is approached or exceeded (i.e. predicted exterior noise level for a residence at ground level must approach or equal 67 dBA to qualify as a traffic noise impact).
- Predicted (design-year) noise levels substantially exceed existing noise levels. DelDOT considers a substantial increase to be at least 10 dBA.

In general, the Delaware Department of Transportation follows the FHWA criteria, for all Type I highway projects. However, DelDOT has chosen not to conduct Type II projects, which provide noise mitigation along existing highways. This is in accordance with FHWA policy, which indicates that Type II mitigation is not a mandatory requirement. In addition, the recently revised Federal policy places new restrictions on the approval of Type II mitigation. The policy states that Type II abatement projects for new activities and land uses, which come into existence, may only be approved when they are proposed along lands where land development or substantial construction predated the existence of any highway. The granting of a building permit, filing of a plot plan or a similar action must have occurred prior to the date of FHWA approval of the Categorical Exclusion, Finding of No Significant Impact, or the Record of Decision, whichever is applicable for a particular project, for the original highway on new location.

L.4 NOISE ANALYSIS PROCEDURES

The Delaware Department of Transportation conducts all highway noise studies in accordance with current FHWA guidelines and procedures, as specifically outlined in FHWA-

DP-45-1R, Sound Procedures for Measuring Highway Noise. Listed below is an outline that summarizes the general procedure utilized by DelDOT when conducting a highway noise study:

- 1 Identification of Noise-Sensitive Land Uses
 - a. Obtain roadway plans to identify noise-sensitive land uses (such as residential, schools, etc.) in the vicinity of a proposed project.
- 2 Determination of Existing Noise Levels
 - a. Noise meter placed near potential noise-sensitive receptors in "areas where frequent use occurs."
 - b. Noise levels recorded for a period of time (ranging from a minimum of ten minutes to twenty-four hours) to obtain a representative sample of ambient noise.
 - c. Classification counts (cars, medium trucks and heavy trucks) and vehicular speeds are documented in the field.
- 3 Comparison of Computed and Measured Noise Levels
 - a. Obtain plans of existing roadways.
 - b. Determine horizontal and vertical coordinates of existing travel lanes, receptors and barriers from plan sheets and profiles.
 - c. Input roadway, receptor and barrier coordinates into traffic noise prediction model that is consistent with the methodology outlined in FHWA-RD-77-108, Highway Traffic Noise Prediction Model, as well as field-recorded traffic volumes (input as hourly totals), classifications and speeds. Determine if site is predominantly absorptive (grass-covered) or non-absorptive. Also, input the effects of shielding factors such as dense vegetation, rows of homes, etc. Once these items are input into the model, existing noise levels can be calculated and compared with the field measurements. Computer model is considered accurate if computed levels

are within 3 dBA of the field recordation.

4 Design-Year Noise Level Prediction

- a. Obtain design-year, peak-hour traffic volumes, truck percentages, truck weight patterns and directional splits.
- b. Obtain plans of future roadway improvements.
- c. Determine horizontal and vertical coordinates of future travel lanes, receptors and barriers from plan sheets and profiles.
- d. Input roadway, receptor and barrier coordinates into traffic noise prediction model, as well as design-year, peak-hour traffic volumes, classifications and speeds. Determine if site will remain predominantly absorptive or non-absorptive. Also, input the effects of shielding factors. Once these items are input into the model, future noise levels at specified receptors can be calculated.
- e. Perform similar procedure to compute noise impacts for the "no-build" alternative as well.

5 Projection of Noise Impact

- a. Analyze predicted noise levels to determine receptors that will approach or exceed the Noise Abatement Criteria.
- b. Compare existing noise levels with predicted levels to determine if there will be a substantial (i.e. > 10 dBA) increase in noise.

6 Mitigation Measures

- a. If noise mitigation is deemed necessary based upon the prediction model, analyze different methods that can be utilized to reduce future noise levels refer to Section VII, Paragraph 11.
- b. If a barrier is determined to be necessary to reduce noise, input horizontal and vertical coordinates of the barrier into the noise prediction model. Also, input whether the barrier is absorptive or reflective.
- c. Utilize OPTIMA software (or compatible model) to perform a noise

barrier analysis, based on the barrier information noted above.

L.5 DECISION CRITERIA

The Federal Highway Administration's noise regulations – 23 CFR 772 – require “the highway agency to identify noise abatement measures which are reasonable and feasible.” The criteria below shall be used by DelDOT to ensure that noise mitigation measures are both reasonable and feasible. The feasibility and reasonableness of a potential noise abatement measure must be evaluated before the Department will examine detailed noise mitigation concepts.

L.5.1 FEASIBILITY

The evaluation of the feasibility of a noise mitigation measure deals primarily with engineering considerations. The Department will design all noise mitigation measures with the intention of achieving a substantial noise reduction, given the conditions of a specific location. The Department will attempt to design noise mitigation that reduces traffic noise levels by at least 5 decibels, in order to provide noticeable and effective attenuation.

However, there are factors that may limit the ability to achieve substantial noise reduction. These factors include but are not limited to the following:

- Safety conditions
- Access requirements for driveways and entrances
- Maintenance requirements
- Topography
- Drainage
- Other noise sources in the area

L.5.2 REASONABLENESS

The Department will evaluate a number of factors when determining if a noise mitigation measure is reasonable. The criteria that shall be used to determine the reasonableness of a noise mitigation measure are listed below:

1. Views of the impacted residents: DelDOT will not consider noise barriers if most of the impacted residents do not want them. The Department will require that local government officials or community groups submit a letter to DelDOT stating the impacted residents' views, prior to the construction of any noise mitigation measure.
2. Noise levels: As stated in Section III of this Policy, noise mitigation will be considered reasonable only for areas where the predicted noise levels for a project approach or exceed the Noise Abatement Criteria, or if the predicted future noise levels for a project exceed existing noise levels by at least 10 decibels.
3. Cost: A noise mitigation measure will be considered reasonable if the total cost does not exceed \$20,000 per benefited residence. A benefited residence is a dwelling unit that would receive a noise reduction of at least 3 decibels from the installation of a noise barrier.
4. Timing of Development: As stated in Section VII of this Policy, noise mitigation will be considered reasonable only for developments that were under construction prior to public knowledge of a Type I transportation project. Public knowledge is considered to be the date of FHWA approval of the Categorical Exclusion, the Finding of No Significant Impact, or the Record of Decision, whichever is applicable for a particular project.
5. Environmental Impacts: A noise mitigation measure will be considered reasonable only if the construction of the measure does not have an adverse impact on the natural environment of the area.

The following is a list of criteria that should be incorporated into the design and construction of a noise barrier by or for the Department.

- 1 Minimum barrier height – 8 feet from ground level to top of barrier.
- 2 Lateral clearance – Barrier must be located within highway's right-of-way. Barrier must be placed in accordance with the clear zone requirements as found in DelDOT's *Road Design Manual* and may not adversely affect sight distance requirements. Safety design standards, including pedestrian access, will not be compromised to provide noise mitigation.
- 3 DelDOT will only provide noise abatement for the ground floor of impacted receptors.
- 4 DelDOT will provide noise abatement to mitigate transportation-related noise only.
- 5 Earth Berm Design – Earth berm minimum design standards are under development.
- 6 Noise Wall Design – All noise walls will be constructed in accordance with the 1989 AASHTO publication, "Guide Specifications for Structural Design of Sound Barriers" or latest edition.
- 7 Maintenance.
 - a. Type I Projects
 - i All noise mitigation measures constructed by the Department in conjunction with a DelDOT project will be located within public right-of-way. DelDOT will provide for the maintenance of all Type I noise walls, earth berms constructed by the Department. In addition, privacy fences constructed by the Department within the public right-of-way, in conjunction with a DelDOT project, will be maintained by DelDOT.
 - ii Noise mitigation barriers constructed as part of a DelDOT project will necessitate the cooperation of the abutting property owners for maintenance. The Right of Way Plans will indicate the need for an access and maintenance easement with the adjoining property owners. In principal

L.6 BARRIER DESIGN CRITERIA

- the easement will provide that the owners will maintain the area abutting the noise mitigation barrier. DelDOT will be responsible for maintaining any drainage ditches built in conjunction with the barrier.
- iii DelDOT will not be responsible for the maintenance of noise mitigation measures installed outside of the limits of public right-of-way. Noise barriers, earth berms installed on private property to mitigate noise are the maintenance responsibility of the property owner. In addition, privacy fences installed outside of the limits of public right-of-way, as a mitigation measure, will not be maintained by DelDOT.
 - b. Mitigation Funded With Suburban Street Funds
 - i Noise mitigation measures constructed with Suburban Street Funds will not be maintained by DelDOT. Barriers, earth berms or privacy fences installed with Suburban Street funding will be maintained by the property owner and/or community.
 - ii Should Suburban Street Funds be used to fund mitigation that DelDOT would have been required to construct (i.e. Type I projects), the Department shall be responsible of its maintenance.
 - 8 In order to offer improved aesthetics and minimize maintenance requirements, all efforts will be made to construct earth berms instead of noise walls. However, the feasibility of both earth berms, privacy fences, and noise walls will be examined in all noise studies conducted by DelDOT.
 - 9 If mitigation is warranted, DelDOT will examine the feasibility of a variety of noise mitigation measures. In addition to noise barriers, DelDOT will examine the following measures for abatement feasibility:
 - a. Acquisition of right-of-way for buffer zones between the receptor and the highway.

- b. Traffic management measures, including but not limited to traffic control devices, prohibiting certain vehicle types, time-use restrictions, and reduced speed limits.
- c. Horizontal and vertical alignment modifications.
- d. Air conditioning and/or insulation for public use or nonprofit institutional structures only.
- e. Other potential noise abatement strategies, including but not limited to the following: examining different types of pavement; type, placement or removal of rumble strips, etc.

L.7 FHWA CATEGORY B LAND USE POLICY

DelDOT will provide abatement only for areas that support developed land use. An area is considered to be a developed land use when the proposed development plan is recorded with the appropriate local government agency and is under construction within the noise impact area or is already constructed.

Developments recorded by the local government agency after public knowledge of a highway and/or transportation project will not be eligible for any DelDOT funded noise mitigation. All noise abatement costs will be the responsibility of the developer for developments approved after public knowledge of a highway project.

Public knowledge for Type I transportation facilities is the date of Federal approval of the Categorical Exclusion (CE), Finding of No Significant Impact (FONSI), or the Record of Decision (ROD), whichever is applicable for a particular project.

In situations where the Department is required to conduct a noise analysis for inclusion in an Final Environmental Impact Statement (FEIS) or a Final Environmental Assessment (EA), the results of the analysis will be made

available to local government planners for their use in land planning decisions.

As part of its comments to the appropriate local government agency during the rezoning process, DelDOT will indicate whether transportation-related noise may present potential noise impacts to the rezoned property in the future.

L.7.1 DEVELOPER RESPONSIBILITIES

The Developer of Land Development Projects will be required to conduct a noise analysis based upon the forecast traffic on the roadway adjacent to the proposed subdivision, for any road that is designated in whole or in part on the DelDOT Functional Classification Map as a principal arterial, a freeway or an interstate. The analysis will include examining mitigation measures to shield future abutting property owners from noise impacts.

Should it be determined that a proposed Land Development project will experience a traffic noise impact, the Department may require the Developer to redesign the site plan, changing impacted areas from sensitive land uses to non-sensitive land uses, thus potentially eliminating the need for a noise barrier. The DelDOT letter of no objection to record the subdivision will be contingent upon a subdivision layout that has been designed to minimize noise impacts following highway construction.

DelDOT will require that the Record Subdivision Plans for proposed Land Development projects include provisions for highway noise abatement, if the results of the analysis described above in Paragraph 6 indicate an adverse noise impact will result. The security that is required to indemnify the construction agreement for subdivision streets shall be increased by one-hundred percent of the estimated cost to construct the noise mitigation measures specified on the Record Subdivision Plans for the lots abutting the proposed streets.

DelDOT will be responsible for insuring that the noise mitigation measure is constructed prior

to accepting the street construction. The plans for streets serving impacted residences must include construction plans for noise barriers and/or walls. Any abatement measures are to be constructed by the developer concurrently with the streets for the Development. Noise mitigation measures shall be designed and constructed to meet DelDOT requirements. The security will not be released by the Department until the noise mitigation measure is constructed to DelDOT standards. Maintenance of any fence, berm or noise wall will remain the responsibility of the Developer or community, as described in a maintenance agreement with DelDOT. A typical section of an earth berm is included in Appendix A for reference.

With regards to the analysis of existing highways where no widenings are planned, a noise study will only be undertaken by DelDOT when funds have been previously provided by the community or the legislature.

L.8 COMMUNITY INVOLVEMENT

DelDOT will present noise mitigation options and solicit public opinion with respect to those options early in the highway planning stages. Public workshops will be utilized as a forum to identify potential noise impacts, as well as to depict possible mitigation measures.

Upon preliminary DelDOT design of a noise mitigation measure, the affected property owners will be afforded the opportunity to comment on the design.

In the event that a community believes noise mitigation is appropriate and the Department does not agree, the community may request an appeal to the Director of Planning. The Director of Planning will convene a review board consisting of the following individuals: the Director of Highway Operations, the Manager of Project Development, the Road Design Engineer (or the Section Head responsible for the project), the Chief of Real Estate, and the Assistant Director for Design Support, to meet with an equivalent number of community

representatives. This board will evaluate the appeal, examine the noise study data and determine the feasibility of any noise mitigation measure. Should the board and the community not be able to reach an agreement, the matter will be referred to the Chief Engineer for final decision.

L.9 CONSTRUCTION NOISE

The following general steps are to be taken for all Type I projects:

During the project development phase, land uses or activities that may be affected by construction noise will be identified.

The Department will determine the measures which may be needed in the plans and specifications to minimize or eliminate adverse construction noise impacts to the community.

If necessary, the identified construction noise abatement measures will be incorporated into the plans and specifications.

L.10 DEPARTURE FROM POLICY

There may be extenuating circumstances where unique or unusual conditions warrant special considerations of highway traffic noise impacts and/or implementation of noise abatement measures. These circumstances could involve areas such as (1) those that are extremely noise sensitive, (2) those where severe traffic noise impacts are anticipated, or (3) those containing Section 4(f) resources. Extenuating circumstances will be considered on an individual project basis.

APPENDIX

Typical Section of an Earth Berm **(To be added at a later date)**